Research is generational for Falk grandson

By Robin Arnette

Under the guidance of Institute scientists and staff, the National Institutes of Health (NIH) Summer Internship Program (SIP) at NIEHS allows talented high school, undergraduate, and graduate students to engage in their own research projects. All 34 participants in this year's program were excited about the summer and quickly settled into the routine of research, workshops, and seminars. For one of them, taking part in these activities had special meaning, simply because of his last name.

Summer intern Michael Falk is the grandson of the late Hans Falk, Ph.D., the Institute's first scientific director and one of the first scientists to join NIEHS in 1967 (see text box). Michael is forging his own research path, by working out a bioinformatics strategy as part of the Mouse Methylome Project, a study cofunded by NTP and the NIEHS Division of Intramural Research, to discover which regions of DNA are involved in the development of spontaneous liver tumors in a particular strain of mice.

Paul Wade, Ph.D., of the Laboratory of Molecular Carcinogenesis, and Alex Merrick, Ph.D., of the NTP, head the Mouse Methylome Project. Pierre Bushel, Ph.D., of the Biostatistics Branch and David Fargo, Ph.D., of the Integrative Bioinformatics Group, serve as Michael's co-mentors. They both believe Michael's involvement in the working group is a good opportunity for him to learn about big data.

Helping to shape NIEHS

During his tenure at NIEHS, Hans Falk made significant contributions to the field of environmental health sciences, such as founding one of the first health hazard assessment groups to evaluate chemical exposure risks, and establishing the listing of chemicals entered into the first NTP Report on Carcinogens. As an expert in chemical carcinogenesis, he authored more than 100 peer-reviewed journal articles on the topic. Falk passed away in 1985, but his legacy of scientific excellence remains the standard at the Institute. One of the longest running lecture series at NIEHS bears his name.

Geared toward science

Michael was born in Connecticut, and grew up in Atlanta, where he graduated from high school in May 2012 with a college preparatory (International Baccalaureate) diploma with distinction. He entered the Georgia Institute of Technology with the intention of getting a degree in materials science and engineering, but midway through the semester, his thinking changed. He wondered whether bioinformatics would be a better fit. He had always enjoyed playing computer games and had taken courses in MATLAB and JAVA, two high-level programming languages. All he needed was a chance to delve into his burgeoning interests.

"I looked around for a summer research project involving big data and found what I was looking for at NIEHS," Michael said.

Summer intern Michael Falk said he believes big data challenges in genomics require the talents of researchers from the computer sciences as well as from the life sciences. (Photo courtesy of Steve McCaw)

Using big data to tackle a big problem

Bushel said the Mouse Methylome Project began after NTP researchers noticed the C3H strain of mice exhibited an historically high incidence of spontaneous liver tumors compared to other strains. They theorized that this variable incidence of liver cancer may be due, in part, to differences in epigenetic machinery and the level of DNA methylation in and around critical tumor suppressor genes.

Michael's goal was to determine which regions of DNA were differentially methylated. Since it involved so much data, he used only 2 out of the 19 mouse autosomal chromosomes to make the project easily manageable. Even so, it was still a lot of data.

"You have to have certain skills to be able to manage very complicated and large data sets, and Michael has been able to digest it all fairly well," Bushel said. "He's bright and pretty savvy with different computing environments."

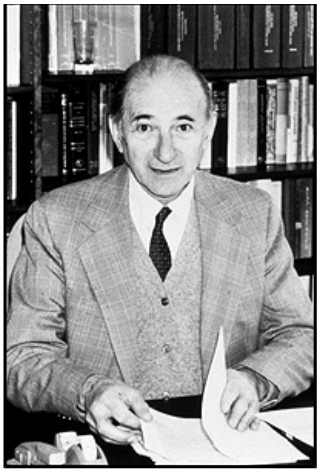
Fargo said the team is only beginning to understand all of the mechanisms that lead to tumor

development in these mice, and agreed that Michael is helping to lay the groundwork for the problem.

"In essence, it's an undiscovered continent of things that can be investigated in the data," Fargo added. "We have the potential to unearth several new projects from it."

The tradition continues

Michael never got the chance to meet his grandfather, but Hans Falk's influence may still be seen in members of the Falk family, who are involved in science in some way. Michael said growing up in that environment probably helped shape his trajectory toward the sciences. He said one of the things he will take away from his research experience at NIEHS is confirmation of his earlier hunch - his new major will be computer science.



Hans Falk at work in an undated photo. (Photo courtesy of NIEHS Photo Archives)

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